

GRAPHICAL USER INTERFACE WITH GESTURE RECOGNITION IN A MULTIAPPLICATION ENVIRONMENT

CROSS-REFERENCES TO RELATED APPLICATIONS

This application is a continuation-in-part of copending application Ser. No. 07/344,879, filed Apr. 28, 1989 by L. An, et al, entitled "Advanced User Interface".

BACKGROUND OF THE INVENTION

This invention relates to improvements in entering input data into digital computers. More particularly, it relates to an advanced user interface which allows a user to select one or more input devices to input data into a computer running a program originally written for a different input device in a multiapplication environment.

In the past, computers were used only by scientists, mathematicians, and other high-level, sophisticated computer users. As computer technology progressed, and particularly with the advent of the personal computer, data processing has reached every level of society, and every level of user. The trend is for fewer computer users to be computer professionals or sophisticated in data processing techniques. Access to computers will increase even further in the future as computer hardware and software increase in power and efficiency.

However, despite the prevalence of computers in our society, many are apprehensive about using them. The traditional text display and alphanumeric keyboard input device are not readily learned, requiring the memorization of the correct format of dozens, if not hundreds, of commands. Unless the user is a reasonably good typist, data entry can be inconvenient and time consuming. The hours of experimentation which may be necessary to become proficient with a single piece of software becomes extremely frustrating for the unsophisticated user who is likely to avoid the effort altogether.

It has therefore become necessary to design what have become known in the art as "user friendly" input devices and computer programs. Such "user friendly" devices and software are designed to allow an unsophisticated user to perform desired tasks without extensive training. One of the more popular input devices is the mouse pointing device. The mouse generates signals corresponding to the direction and distance it is moved across a flat surface by the user. The computer responds to this information by changing the position of the cursor on the computer display to allow the user to point to any displayed object. Once the cursor is correctly positioned, the user can perform a number of functions by depressing one or more buttons on top of the mouse.

Human factor studies have shown that a device which allows the user to input data directly on the visual display screen of a computer, generally known in the art as a touch input device, achieves greatest immediacy and accuracy between man and machine. One of the first input devices for use at the display surface was the light pen. The light pen is an optical detector in a hand held stylus, which is placed against the face of a cathode ray tube. The location of the light pen is determined by detecting the coordinates of the dot of light which is the scanning raster of the display. A second type of touch input device is a mechanical deformation

membrane which is placed over the display screen. The membrane is a transparent overlay which consists of two transparent conductor planes disposed on a flexible surface. When a selection is made, the user mechanically displaces one of the conductor planes to touch the other by a finger or stylus touch, thereby bringing the conductors into electrical contact with each other. Appropriate electronics and software translate the electrical signals generated by the finger or stylus touch to the position on the display surface. Another touch input device is a capacitive transparent overlay placed over the display screen, which includes transparent conductors driven by an electromagnetic signal. The input device can detect the location of a finger touch by the change in capacitance of the overlay or, alternately, a stylus is used to return the electromagnetic signals from the overlay back to the computer to determine the stylus position. Yet another touch input device uses a frame which fits around the display screen having a number of infrared or visible light transmitters and receptors arranged in parallel horizontal and vertical directions. When the user's finger blocks the light beams, the horizontal and vertical receptors note the absence of the signals, thereby locating the position of the action desired by the user.

Many other user friendly input devices which respond to actions of the user such as voice recognition units or digital tablets, have been developed.

In addition to user friendly input devices, designers have made efforts to develop more user friendly software. One technique which has been employed is to provide the user with a menu of choices of the particular tasks or functions which can be performed. In this way, the user is not required to commit long lists of commands to memory. The menu can be a full or partial screen display with spaces adjacent to the menu entries to which the cursor is moved by keyboard or by other cursor moving device to select a particular action. Alternatively, the user can select an action by entering an alphanumeric character associated with the menu selection on a command line.

Another recent trend is to provide some sort of integration of computer program applications. Without integration, the user must employ separate application programs for word processing, database manipulation, graphics and electronic mail functions, and so forth. It is often quite difficult to integrate the outputs of the different programs into a single desired output. One solution has been to write a single integrated piece of software which incorporates a variety of applications which is called a multiple-function program. Typically, these multiple-function programs include text, spreadsheet, and business graphing applications.

Another approach is to provide an integrated operating environment as implemented by Microsoft WINDOWS™ or IBM Presentation Manager™. In this approach, individual application programs share information and often appear on the display screen at the same time, each in its own window. By selecting the strongest individual application programs, a much more powerful environment can be tailored for the user's particular needs, in contrast to multi-function programs where the user is limited to whatever applications have been programmed into the package.

Unfortunately, while many user friendly input devices and many user friendly computer programs have been developed, these efforts have not been well inte-